

MARAIS DES CYGNES RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Pomona Lake Water Quality Impairment: Siltation

Subbasin: Upper Marais des Cygnes

Counties: Osage, Wabaunsee, and Lyon

HUC 8: 10290101

HUC 11 (HUC 14): 030 (010, 020, 030, 040, 050, 060, 070, 080)

Drainage Area: Approximately 319.0 square miles.

Conservation Pool: Area = 4,131 acres, Maximum Depth = 15 meters

Designated Uses: Primary and Secondary Contact Recreation; Expected Aquatic Life Support; Drinking Water; Industrial Water Supply Use; Food Procurement

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: Aquatic Life Support

Water Quality Standard: Suspended solids - Narrative: Suspended solids added to surface waters by artificial sources shall not interfere with the behavior, reproduction, physical habitat or other factor related to the survival and propagation of aquatic or semi-aquatic or terrestrial wildlife. (KAR 28-16-28e(c)(2)(D)).

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Monitoring Sites: Station 028001 in Pomona Lake.

Period of Record Used: Nine surveys during 1987 - 2000.

Current Condition: Surface water in Pomona Lake has high turbidity, dominated by inorganic materials because the lake receives a steady inflow of silt. The lake is light limited. The average transparency (Secchi Disc depth) is 44.0 cm (Figure 1), the average turbidity is 38.2 formazin turbidity units (Figure 2), and the average total suspended solid concentration is 30.5 mg/L (Figure 3). The siltation impairment was most severe in 1996; the samples were taken after a high flow event. See the table below.

Figure 1

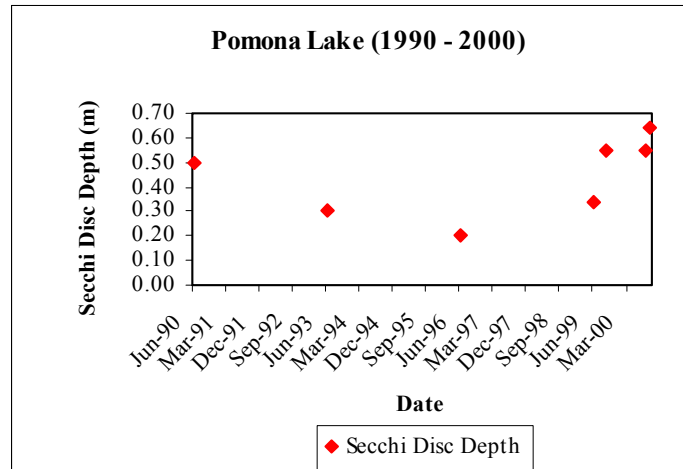


Figure 2

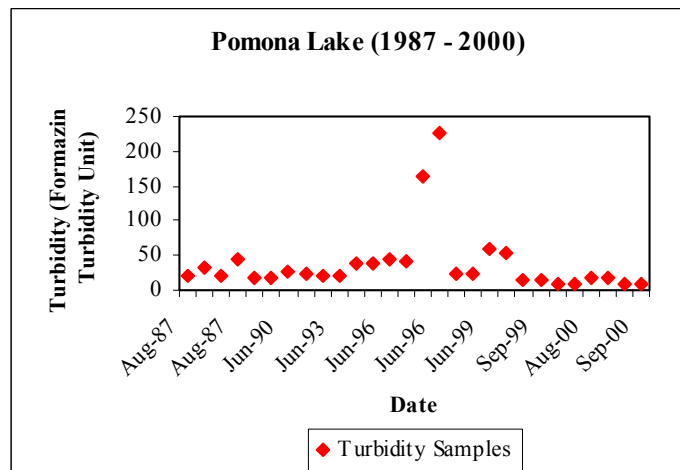
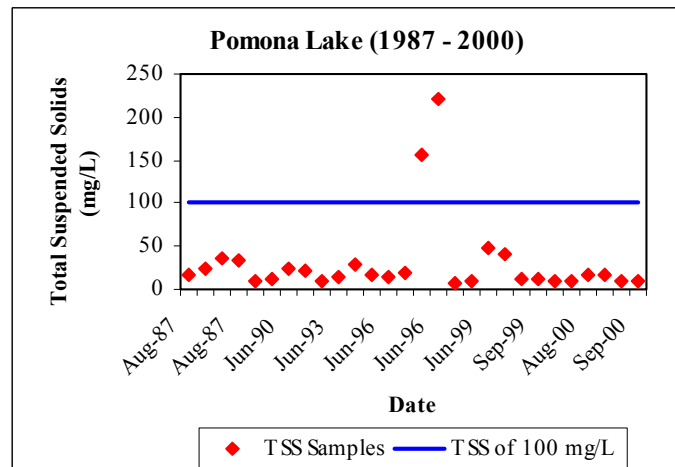


Figure 3



	DATE	Average Total Suspended Solids	Average Turbidity	Secchi Depth	Lake Elevation
LM028001	8/25/87	27.25	29.75		
LM028001	6/11/90	16.50	21.30	0.50	
LM028001	6/14/93	17.50	31.00	0.30	976.44
LM028001	6/10/96	102.50	119.25	0.20	983.18
LM028001	6/8/99	26.50	41.00	0.34	977.31
LM028001	9/7/99	11.00	14.00		973.56
LM028001	7/1/00			0.55	975.38
LM028001	8/23/00	13.50	13.75	0.55	973.63
LM028001	9/5/00	9.00	8.85	0.64	973.18

In 1989, the Army Corps of Engineers determined that the annual sediment deposition rate was 263 acre-feet.

Interim Endpoints of Water Quality (Implied Load Capacity) at Pomona Lake over 2005 - 2009:

In order to improve the quality of the water column, the endpoint for Pomona Lake will be an increase in average transparency as measured by Secchi Disc Depth of 0.85 meter. The CNET model predicted that if the chlorophyll a concentration was 12 ppb and the phosphorus levels were reduced (as specified in the Pomona Lake Eutrophication TMDL), then the Secchi Disc Depth would be 0.85 meter. Much of the phosphorus coming into Pomona Lake is attached to sediment. By reducing the sediment load, the phosphorus concentrations are reduced and the clarity of the water (the Secchi Disc Depth) is increased.

This TMDL endpoint meets water quality standards as measured and determined by Kansas Water Quality Assessment protocols. These assessment protocols are similar to those used to cite the stream segments in this watershed as impaired on the Kansas 1998 Section 303(d) list.

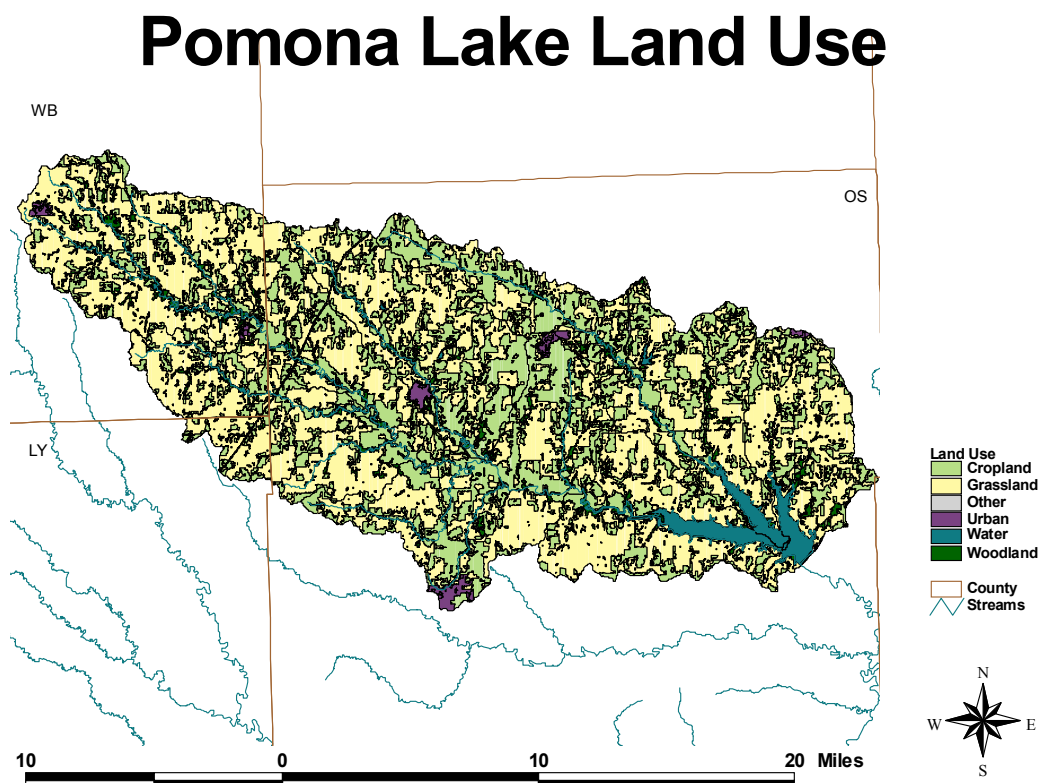
Seasonal variation in the endpoint is not established by this TMDL. This endpoint can be reached as a result of expected reductions in loading from the various sources in the watershed resulting from implementation of corrective actions and Best Management Practices, as directed by this TMDL. Achievement of the endpoints indicates loads are within the loading capacity of the stream, water quality standards are attained and full support of the designated uses of the stream has been restored, therefore the narrative water quality standard pertaining to suspended solids would be attained.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: The siltation impairment is most likely due to cropland. Soil from exposed land runs-off into the lake, increasing the turbidity and concentration of total suspended solids and decreasing the transparency. Land use coverage analysis indicates that 35.4% of the watershed is cropland, and 56.6 % is grassland (Figure 4). More woodland and grassland are needed around the streams to prevent erosion.

Sediment from urban land may get transported into the watershed. However, this source is probably not a major contributor because there is minimal urban land (1% of the watershed) around the lake and population projections for the county to the year 2020 indicate moderate growth in population.

Figure 4



Contributing Runoff: The watershed's average soil permeability is 0.5 inches/hour according to NRCS STATSGO database. About 99% of the watershed produces runoff even under relatively low (1.5"/hr) potential runoff conditions. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5"/hr of rain will generate runoff from only 79.0% of this watershed, chiefly along the stream channels.

Background Levels: Carp may cause some resuspension of sediment. Background levels of total suspended solids come from geological sources. Sediment becomes suspended during high flow events as soil along the banks is eroded.

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

The Load Capacity of Pomona Lake is 120 acre-feet per year. More detailed assessment of sources and confirmation of the siltation impairment must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

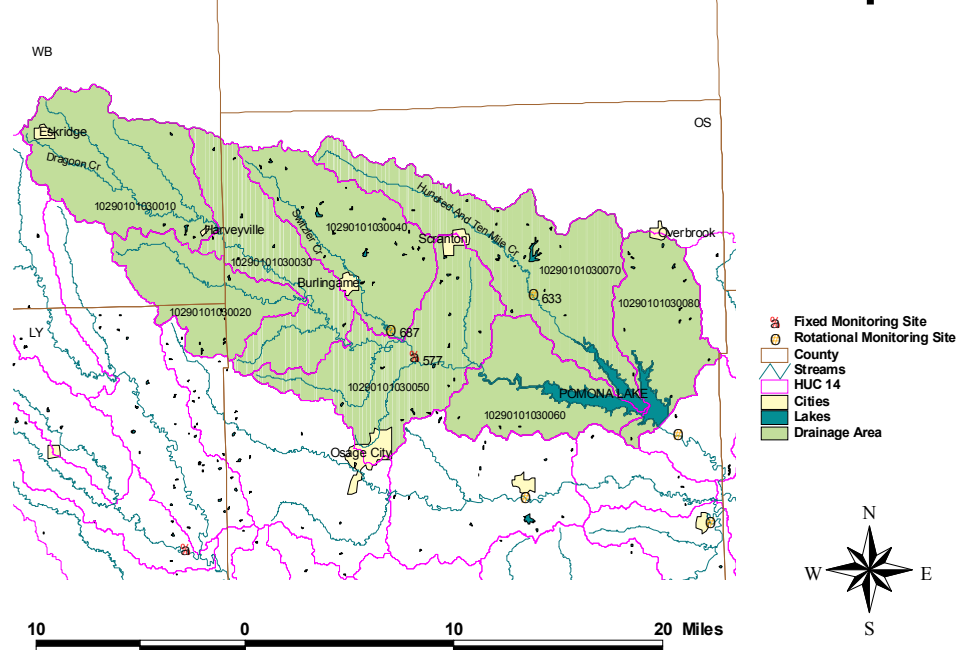
Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources in the watershed. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current wasteload allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers.

Nonpoint Sources: Siltation loading comes predominantly from nonpoint sources. Given the runoff characteristics of the watershed, overland runoff can easily carry sediment into the lake. The Load Allocation will be a 54.5% reduction in average sediment load or 120 acre-feet per year (45.5% of the annual sediment deposition rate of 263 acre-feet).

Defined Margin of Safety: The margin of safety will account for the uncertainty in suspended solids reaching the conservation pool and its resulting transparency, hence, the margin of safety will be defined as a maximum suspended solid concentration in the lake water column of 100 mg/l.

Figure 5

Pomona Lake TMDL Reference Map



State Water Plan Implementation Priority: Because Pomona Lake is a federal reservoir with a large regional benefit for recreation and water supply, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Upper Marais des Cygnes (HUC 8: 10290101) with a priority ranking of 5 (High Priority for restoration).

Priority HUC 11s: The watershed is within HUC 11 (030) (Figure 5).

5. IMPLEMENTATION

Desired Implementation Activities

There is a very good potential that agricultural best management practices will allow full use support to take place in Pomona Lake. Some of the recommended agricultural practices are as follows:

1. Maintain conservation tillage and contour farming to minimize cropland erosion.
2. Install grass buffer strips along streams.
3. Reduce activities within riparian areas.

Implementation Programs Guidance

Nonpoint Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities as well as nutrient management.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.

Water Resource Cost Share and Nonpoint Source Pollution Control Program - SCC

- a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.
- b. Provide sediment control practices to minimize erosion and sediment and nutrient transport.

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects.

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out

of production.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate agricultural producers on sediment, nutrient, and pasture management.
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff.

Time Frame for Implementation: Pollutant reduction practices should be installed within the priority subwatersheds during the years 2002-2006, with minor follow up implementation, including other subwatersheds over 2006-2010.

Targeted Participants: Primary participants for implementation will be agricultural producers within the drainage of the lake. Initial work in 2006 should include local assessments by conservation district personnel and county extension agents to locate within the lake drainage:

1. Total row crop acreage
2. Cultivation alongside lake

Milestone for 2006: The year 2006 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, sampled data from Pomona Lake should indicate evidence of reduced siltation in the conservation pool elevations relative to the conditions seen over 1987-2000.

Delivery Agents: The primary delivery agents for program participation will be conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollutants.

1. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.
2. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.
3. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.

4. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.

5. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.

6. The *Kansas Water Plan* and the Marais des Cygnes Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund annually generates \$16-18 million and is the primary funding mechanism for implementing water quality protection and pollutant reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL are a High Priority consideration.

Effectiveness: Sediment control has been proven effective through conservation tillage, contour farming, and use of grass waterways and buffer strips. The key to success will be widespread utilization of conservation farming within the watersheds cited in this TMDL.

6. MONITORING

Additional data, to establish sediment loading and further determine mean summer lake trophic condition, would be of value prior to 2005. Further sampling and evaluation should occur once before 2005 and twice between 2005 and 2009.

7. FEEDBACK

Public Meeting: The public meeting to discuss TMDLs in the Marais des Cygnes Basin was held February 28, 2001 in Ottawa. An active Internet Web site was established at <http://www.kdhe.state.ks.us/tmdl/> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Marais des Cygnes Basin.

Public Hearings: Public Hearings on the TMDLs of the Marais des Cygnes Basin were held in Fort Scott on May 30 and Ottawa on May 31, 2001.

Basin Advisory Committee: The Marais des Cygnes Basin Advisory Committee met to discuss the TMDLs in the basin on October 4, 2000, February 28 and May 30, 2001.

Milestone Evaluation: In 2006, evaluation will be made as to the degree of implementation

which has occurred within the watershed and current condition of Pomona Lake. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

Consideration for 303(d) Delisting: The lake will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2005-2009. Therefore, the decision for delisting will come about in the preparation of the 2010 303(d) list. Should modifications be made to the applicable water quality criteria during the ten-year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2002-2006.